



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/044,731	01/11/2002	Raj Prakash	004-6540	1596

42714 7590 03/21/2007  
SUN MICROSYSTEMS, INC.  
ATTN: TIMOTHY SCHULTE  
ONE STORAGETEK DRIVE, MS 4309  
LOUISVILLE, CO 80028-4309

EXAMINER
----------

MITCHELL, JASON D

ART UNIT	PAPER NUMBER
----------	--------------

2193

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/21/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/044,731	PRAKASH, RAJ	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jason Mitchell	2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 33-48 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 33-48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Claims 1-5 and 33-48 are pending in this application.

### ***Response to Arguments***

2. **Applicant's arguments filed 1/03/07 have been fully considered but they are not persuasive.**

3. **In section II.A.1 of the response** Applicant asserts the modification of Lindholm as combined with Shirazi and Gupta is inoperable because the exceptions in Lindholm's 'exception\_table' are not able to be modified by user operations and/or compiler optimizations.

Examiner disagrees. The portion of Lindholm cited by Applicant (pg. 122, lines 4-8) as indicating that the exception table "is not able to be modified" only states "The order of the handlers in the exception\_table array is significant" and directs the reader to section 3.10 for more details. In section 3.10, pg. 79, Lindholm explains that the order is significant because "the Java virtual machine searches the exception handlers ... in the order that they appear in the corresponding exception handler table". Thus it can be seen that the 'significance' of the order does not preclude user or compiler modification.

As further evidence, at the top of pg. 79 Lindholm discloses "each catch or finally clause of a method is represented by an exception handler". Those of ordinary skill in

Art Unit: 2193

the art will recognize that 'catch' and 'finally' clauses are defined in source code and thus are clearly modifiable by either a user or a compiler.

4. **In section II.A.2 of the response** Applicant asserts that Lindholm does not disclose "a fault to target translation table" because Lindholm's 'exception\_table' merely handles default exceptions included within the constructs of the JVM.

In section 2.16, pg. 40, Lindholm discloses "Programs can also throw exceptions explicitly, using throw statements". As discussed above, those of ordinary skill in the art would have recognized that 'throw' statements and the associated 'catch' and 'finally' clauses (discussed e.g. on pg. 79) are source code statements modifiable by users and or compilers. Thus it can be seen that Lindholm's exception table contains user-defined exceptions and not merely default JVM exceptions.

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. **Claim 4 recites the limitation "the fault to target translation data" in line 2.**

**There is insufficient antecedent basis for this limitation in the claim.**

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. **Claims 1-5 and 33-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over “Java Performance Tuning” by Shirazi, in view of “The Java Virtual Machine Specification” by Lindholm et al. and further in view of “Path Profile Guided Partial Dead Code Elimination Using Prediction” by Gupta et al.**

9. **Regarding Claims 1, 33, 41 and 44:** Shirazi discloses a method of bypassing a null pointer condition check when compiling a source program (*pp. 75-76 “Cut dead code and unnecessary instructions, including checks for null”*) comprising:

eliminating the null pointer condition check, if the null pointer condition check infrequently encounters null pointer conditions (pg. 76 “This flow analysis can be extended to determine if other sections and code branches ... are actually semantically unreachable. A typical example is testing for null. Some null tests can be eliminated by establishing that the variable has either definitely been assigned to ... before the test is reached.”)

10. Shirazi does not disclose creating an entry in a fault to target translation table for null pointer conditions corresponding to the null pointer condition check.

11. Lindholm teaches creating an entry in a fault to target translation table for null pointer conditions that correspond to a null pointer condition check (pg. 122 “Each entry in the exception\_table array describes one exception handler in the code array.”; pg. 44 “NullPointerException: An attempt was made to use a null reference in a case where an object reference was required”).

12. Neither Shirazi nor Lindholm disclose addressing situations where it is only unlikely (as opposed to impossible as in Shirazi) that a null pointer condition will occur.

13. Gupta teaches that “an optimizer should exploit path profiling information to reduce dead code along frequently executed paths even if doing so introduces some additional instructions along infrequently executed paths” (see pg. 2, col. 2).

14. Accordingly it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Shirazi, Lindholm and Gupta in such a way that Shirazi’s flow analysis (pg. 76 “flow analysis can be extended”) will additionally perform the analysis taught in Gupta to find ‘infrequently executed paths’ such as a null pointer condition check infrequently encountering a null pointer condition and remove the checks (pg. 2, col. 2 “reduce dead code along frequently executed paths”). Further, because null pointer conditions may occur (although infrequently) it would also have been obvious to add an exception handler as taught by Lindholm (pg.

Art Unit: 2193

122 "entry in the exception\_table array") to catch any null pointer conditions that might have (albeit infrequently) occurred ,and thus ensure proper execution of the program.

15. **Regarding Claims 2, 34-36, 43 and 48:** Further Gupta teaches gathering statistics as to the number of null pointer condition occurrences the null pointer condition check encounters (Title "Path Profile Guided Partial Dead Code elimination") and determining an acceptable rate of occurrence (pg. 3, col. 1 "During cost-benefit analysis only the frequently executed paths are accurately analyzed").

16. **Regarding Claims 3, 45:** Further Lindholm teaches responsive to a fault that corresponds to a null pointer condition, using a handler program to direct the fault to a target indicated by fault to target translation data in the fault to target translation table (pg. 122 "the value of the handler\_pc item indicates the start of the exception handler.").

17. **Regarding Claims 4, 38:** Further Lindholm teaches passing the fault to target translation data from the fault to target translation table to a compiler using a handler program (pg. 120 "A Code attribute contains the Java virtual machine instructions and auxiliary information for a single method").

18. **Regarding Claims 5, 37:** Further Shirazi discloses compiling the source program to an executable program (pp. 74-76 'Compilers can apply many "classic" optimizations');

19. Lindholm teaches accessing the fault to target translation table during the compiling of the source program (pg. 120 "A Code attribute contains the Java virtual machine instructions and auxiliary information for a single method").

20. **Regarding Claims 39, 40, 42, 46:** Further Lindholm teaches the table indicating instruction identifiers for instructions that cause faults corresponding to the eliminated null pointer condition checks and identifiers for the null pointer condition handling code units (pg. 122 "start\_pc, end\_pc ... handler\_pc")

21. **Regarding Claim 47:** Further, Shirazi discloses instructions to generate an executable representation of the program with eliminated null pointer condition checks (pp. 74-76 'Compilers can apply many "classic" optimizations ... Some null tests can be eliminated').

### ***Conclusion***

22. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the




Art Unit: 2193

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Mitchell whose telephone number is (571) 272-3728. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Jason Mitchell



MENG-AI AN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2100

: